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54 Improvements in quartz infra-red lamps.

57 An infra-red lamp consists of a quartz tubular envelope (1) filled with a halogen gas and sealed at each end with a respective pinch seal (2). A coiled coil tungsten filament (8) is supported within the envelope (1) and is electrically connected, via a molybdenum foil strip (4) and lead wires (6) within the pinch seal (2), to a connector (5) for connection to a power supply.

The coiled coil filament (8) is supported by a number of tungsten wire spirals (9) spaced along the length of the filament (8), each spiral (9) being intermeshed with the filament (8).

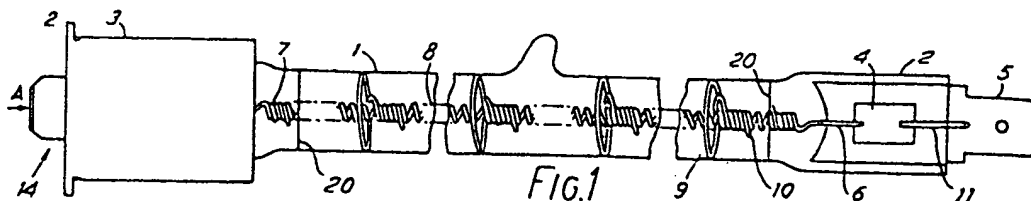


Fig.1

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IMPROVEMENTS IN QUARTZ INFRA-RED LAMPS

The present invention relates to quartz-halogen linear filament infra-red lamps.

Tungsten halogen linear filament lamps have been provided, consisting of a tubular quartz or other high silica content  
5 glass envelope having at each end an electrical lead through sealed in a respective pinch seal.

The lamps have a linear tungsten filament of well established form extending between the through-leads and appropriately supported within the envelope. They are filled  
10 with a suitable fill gas to operate according to the well known tungsten halogen regenerative cycle.

Such lamps are generally for the purpose of illumination but have also been adapted for the purpose of heating. To that end the filament dimensions and electrical rating, are chosen to  
15 emit primarily in the infra-red. By this means lamps rated at about 350 watts to about 2.0 K watts have been produced, most of the energy being available as heat, for example for paint drying.

It has been proposed in a co-pending patent application  
20 No.8320717 in the name of THORN EMI Domestic Electrical Appliances, to use an array of such lamps disposed beneath a ceramic hob surface to provide an element unit for a cooker hob. In such an environment the conventional infra-red lamp construction, in particular the construction of the end  
25 connection, has proved to be less satisfactory than was hoped to be the case.

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It is an object of this invention to provide an improved construction of linear filament infra-red lamp for the said purpose.

According to the invention there is provided a halogen  
5 cycle infra-red lamp including a generally linear filament supported within a tubular envelope of high silica content glass having, at each end thereof : a pinch seal with an electrical lead to the respective end of the filament sealed therein; an electrical connection means for coupling said filament to an  
10 electrical power supply, said connection means being electrically connected to said electrical lead and emergent externally from said pinch seal; and a ceramic housing substantially enclosing the pinch seal to protect the seal in part from heat emitted by the filament and to assist in location  
15 of the lamp in an operating environment.

Preferably the electrical connection means is a spade connector.

Preferably the ceramic housing allows a heat transfer connection with a mating locating means in a unit in which the  
20 lamp is used and to that end it may have flat outer surfaces being, for example, rectangular in section. Preferably also it includes a locating flange.

Preferably the lamp envelope is coated along substantially its entire length and for about half of its circumference with  
25 an infra-red reflective coating.

In order that the invention may be clearly understood and readily carried into effect it will now be described by way of example with reference to the accompanying drawings, of which,

Figure 1 shows a linear filament tungsten halogen infra-red  
30 lamp incorporating the invention,

Figure 2 shows an end elevation (viewed from A) of the lamp of Figure 1,

Figure 3 shows in its entirety, a lamp in accordance with the invention for better illustration of its proportions,

35 Figure 4 is a view on ZZ of Figure 3 and

Figures 5a, 5b and 5c show respectively plan, end and side

elevations of a cooking hob heating element unit incorporating four lamps in accordance with this invention.

In the lamp of Figure 1, a tubular envelope 1 of quartz, or other high silica content glass, is sealed at each end with a  
5 respective pinch seal 2. Each end of the lamp is fitted with a ceramic cap 3 but in Figure 1 the end cap is omitted from one end to show the structure within it. Molybdenum foil strips 4 in the pinch seals 2 connect a contact 5 with filament lead  
10 wires 6, which terminate in screw coils 7, screwed into the end of a coil, or coiled coil, filament 8. Spaced filament supports 9 are spirals of tungsten wire fitting loosely in the tube 1 and terminating axially in coils 10 which are wound into the filament coil and mesh therewith.

As this far described the lamp of Figure 1 is similar to a  
15 conventional linear filament tungsten halogen lamp. To provide an infra-red lamp the filament rating and operating temperature are chosen appropriately to make the lamp operate to a greater degree in the infra-red.

The lamp of Figure 1 differs from the known linear filament  
20 infra-red lamp in the construction of the end connections. It is considered to be desirable, for the use in domestic electric cooker hobs mentioned hereinbefore, for the end connection to be by a push-on connection whereby electrical connection to the lamp may be by a flying-lead method, allowing it to be  
25 independent of the support of the lamp. For this reason a lead 11 emergent from the pinch seal is welded to an appropriate connector, in the preferred example shown, a spade connector, which forms the contact 5. Electrical connection thereto is then by an appropriate female connector.

30 At each end of the lamp, illustrated at the left hand end in Figure 1, the pinch seal is enclosed in a moulded ceramic housing which forms the ceramic cap 3. The ceramic clearly should be able to resist the heat generated and a material such as Steatite is suitable. This housing 3 differs from the prior  
35 art ceramic cap in that it substantially wholly encloses the pinch seal 2. Furthermore, as shown in the end elevation of

Figure 2, it is of generally rectangular cross section having a flange 12 at the outer end and on three sides thereof, for location purposes.

The housing 3 has a generally rectangular aperture 13  
5 extending therethrough generally axially so that the pinch seal may be inserted therein with the spade terminal 5 emergent from the outer end as shown at 14. It will be appreciated that the connectors 5 need not be visibly emergent from the aperture if not required but they must be effectively emergent to a  
10 sufficient extent to allow connection to be made. The apertures 13 are of sufficient size to make the pinch seal 2 a relatively loose fit therein and the lamp is then secured by filling the lower part of the aperture with a suitable cement (a high temperature cement such as Sauereisen cement), leaving  
15 clear space for the mating female connector to be inserted.

This construction is devised in part to allow rapid and convenient electrical connection in production of the cooker and also rapid and convenient location of the lamp in the element array. There is, however, a further consideration in its  
20 design, namely a beneficial construction in relation to heat dissipation in an infra-red element.

The ceramic housing 3 by substantially enclosing the pinch seal 2 acts in part as a heat sink and in part as a shield between the heat emitting filament 8 and the electrical  
25 connection between connector 5 and its mating connector.

The unit into which the lamp of Figures 1 and 2 is located is provided itself with locating casings which act as heat sinks. These are arranged to locate and contact the housing so as to improve the heat transfer therefrom and the heat sink  
30 effect. The fit of the housing 3 in these casings should, however, be sufficiently free to allow for expansion of the ceramic during operation, to prevent damage to the lamp, unless care is taken to match the respective coefficients of expansion.

The lamp of Figure 1 is incomplete as illustrated because  
35 the proportion of length to diameter of a typical 500 watt lamp does not facilitate illustration. To more clearly illustrate

typical proportions the lamp is shown in full in side elevation in Figure 3 and in section on ZZ of Figure 3 in Figure 4.

Thus 240V, 500 watt lamp is typically about 240mm total length, about 190mm envelope length and about 140mm filament length. Lamps of other ratings may be used and these would, of course, have different dimensions.

An element unit for a cooker hob, incorporating four 500 watt lamps is shown in plan, end and side elevation in Figures 5a, 5b and 5c respectively.

Except insofar as these Figures show lamps according to this invention and as described herein, Figures 5a, b and c show a construction for the unit which is the subject matter of the above-mentioned patent application No.8320717. It can be seen that the ceramic housing 3 are located, with the assistance of flanges 12, in locating members 15 in a casing 16 which aids the heat sink effect. Electrical connection is in this example by female connectors 17 of which only one is shown.

The mounting is such that four lamps are mounted in parallel positions inside casing 16 and beneath a suitable ceramic surface 18 which is the cooking surface in conventional manner.

To prevent excessive emission of visible light the ceramic surface 18 may be coloured, preferably red. However the lamp itself may have an infra-red transmissive red shield or be of the beneficial construction, for reducing emission of visible light, described in our co-pending patent application No.82 04413.

Although the lamp described herein includes a particular internal construction and filament support, it will be appreciated that this internal construction is immaterial to the present invention and may be varied as desired.

In the construction shown in Figures 5a, b and c it is found beneficial if the lamp is coated for substantially its entire length and about half of its circumference with a heat reflective coating which, as shown at 19 in Figure 5c, is disposed to reflect heat away from the lower part of casing 16

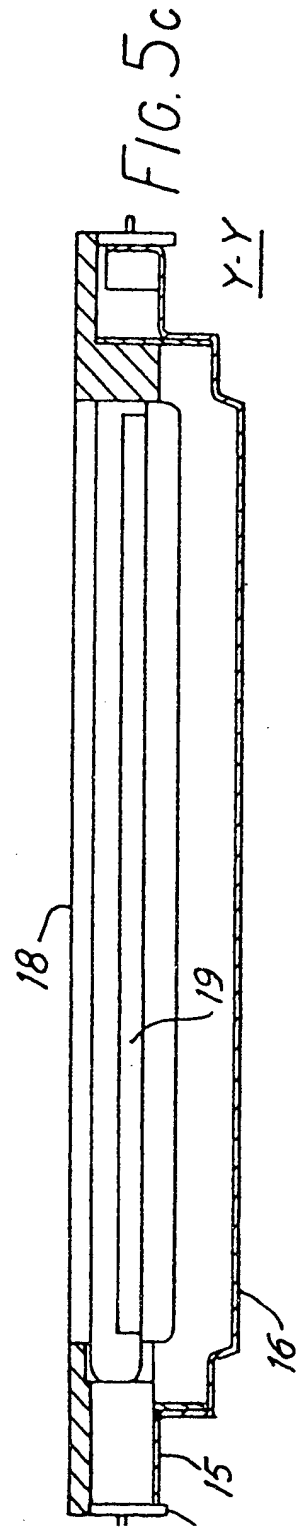
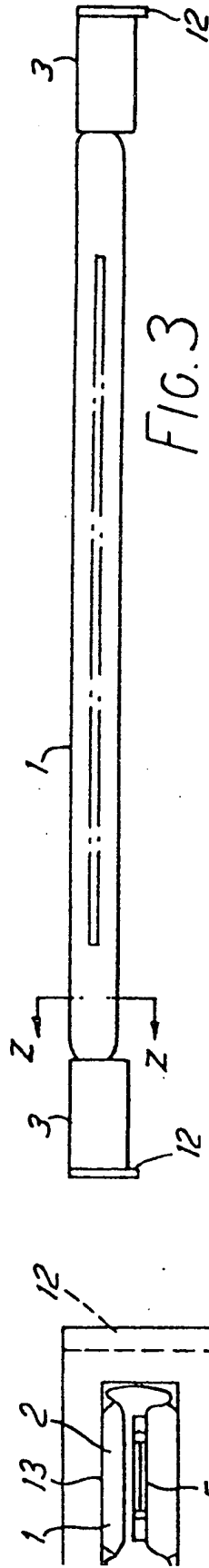
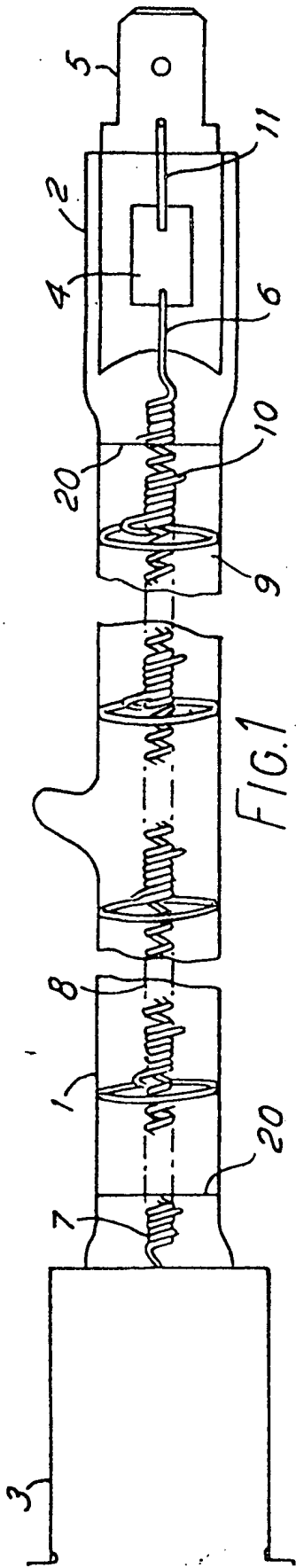
to the ceramic surface 18. That coating is a preferred feature of the lamp of the present invention and, referring again to Figure 1, extends between the limits shown at 20.

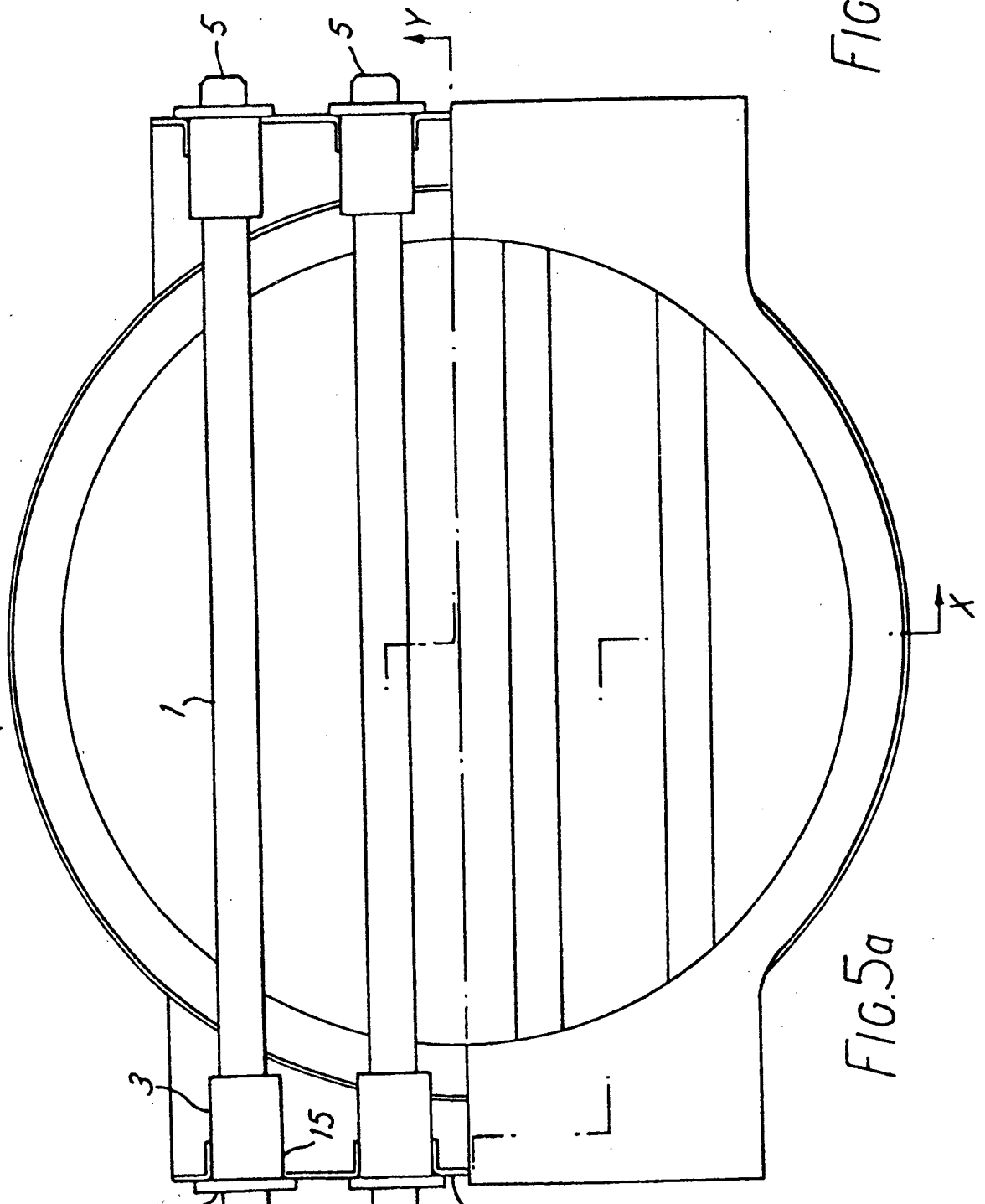
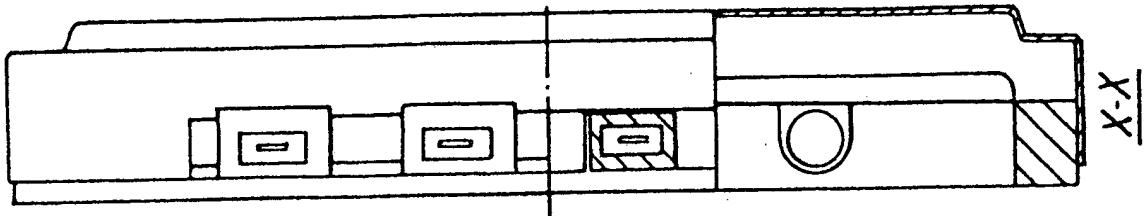
5 A suitable coating is a gold or rhodium coating, which is applied to the quartz by a suitable process, such as evaporation or by use of an electron beam gun, and may also require a suitable protective layer over it. Alternatively aluminium oxide may be used as a suitable coating, which may for example be flame-sprayed onto the quartz envelope. Another alternative  
10 suitable coating is titanium dioxide, which may be mixed with a glass frit.

CLAIMS

1. An infra-red lamp including a tungsten filament (8)  
supported within a sealed tubular envelope (1), said envelope  
(1) being formed from a high silica content glass and filled  
with a halogen gas, and characterised in that said tungsten  
5 filament (8) consists of a coiled coil filament.
2. A lamp as claimed in claim 1 wherein said coiled coil  
filament (8) is supported by a number of wire spirals (9) spaced  
along the length of said filament (8).
3. A lamp as claimed in claim 2 wherein said spirals (9) are  
10 intermeshed with said coiled coil filament (8).
4. A lamp as claimed in claim 2 or 3 wherein said spirals (9)  
are formed from tungsten wire.
5. A lamp as claimed in any preceding claim wherein each end  
of said envelope (1) is provided with a pinch seal having sealed  
15 therein a connection between an electrical lead (6) to the  
respective end of said filament (8) and electrical connection  
means (5) for coupling said filament (8) to an electrical power  
supply.
6. A lamp as claimed in claim 5 wherein said electrical lead  
20 (6) and said electrical connection means (5) are connected via a  
strip (4) of molybdenum foil.
7. A heating unit for use in a cooking hob, said unit  
incorporating at least one infra-red lamp as claimed in any  
preceding claim.
- 25 8. A cooking hob including a ceramic upper surface (18), below  
which at least one heating unit as claimed in claim 8 is mounted.

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European Patent  
Office

# EUROPEAN SEARCH REPORT

0163348

Application number

EP 85 20 0808

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	FR-A-2 390 001 (PHILIPS) * Page 1, line 33 - page 2, line 2; page 5, line 16 - page 7, line 5; figures 1-6 *	1-6	H 01 K 1/14 H 01 K 1/24
A	FR-A-2 308 198 (PHILIPS) * Page 3, line 14 - page 4, line 32; figures 1-6 *	1,5-8	
A	US-A-3 602 761 (S.F.KIMBALL et al.) * Column 2, line 21 - column 3, line 5; figure 1 *	1-3,5,6	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			H 01 K 1/00 H 05 B 3/00
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11-07-1985	Examiner SARNEEL A.P.T.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons	